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EFFECTIVENESS OF MODERN METHODS OF TREATMENT OF RETINOSCHISIS

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ANNOTATION: Retinoschisis, as an independent and complex type of vitreoretinal eye pathology, requires a careful, methodical approach to its diagnosis and treatment. Retinal pseudocysts are formed in various diseases, such as hereditary retinal degenerations, diabetes, trauma, glaucoma, uveitis, myopia, etc., so retinoschisis is always secondary. However, pseudocysts have a similar clinical picture and have one common feature - splitting of the layers of the retina. It is also known that such a pathology as retinoschisis has numerous variants of clinical manifestation - from gentle, subtle ophthalmoscopically microcystic degenerations to huge slit-like spaces that stratify the retina along its entire length, with folds, hemorrhages and ruptures. Very often this form of retinoschisis is diagnosed as retinal detachment. In this case, a not entirely adequate treatment strategy may be used, which leads to unsatisfactory results. It has also been noted that the number of patients with retinal cysts is increasing every year [1]. However, there is no consensus on the methods of treating this complex vitreoretinal pathology [3]. Most authors prefer to use laser and extrascleral surgical treatment methods for progressive forms of retinoschisis [4, 11].

Key words: hypoparathyroidism, cataract, parathyroid hormone, retinoschisis, segment-oval implant, retina

Relevance of the problem. Monolithic silicone implants, porous tourniquets and simulated implants used so far in the surgical treatment of stage III retinoschisis do not meet modern requirements and do not fully satisfy ophthalmic surgeons. This is due to difficulties when using monolithic implants, since in order for them to create an indentation shaft it is necessary to apply a very significant tension to the U-shaped sutures over the filling. In this case, the material tends to return to its original position, and the seams often cut through. Sometimes, when the sclera is thinned, the implant is able to sink into the eye [1]. The use of entire porous cords, which have a circular cross-section in cross-section, is also associated with a number of negative aspects: when fixing them to the sclera with U-shaped sutures, to create an indentation shaft, it is necessary to stretch both ends of the implant and simultaneously tie the sutures. As a result, excessive tension also occurs in the area of the sutures, which over time, taking into account their disaggregation, often erupt and extrusion of the implant occurs. When applying circular pressure with a complete rope, its shortening is carried out arbitrarily, since it is not possible to carry out accurate calculations in each specific case. Therefore, even slight compression of the implant in the postoperative period can manifest as compartment syndrome, characterized by increased IOP, ciliary pain, corneal edema and a sharp decrease in visual function [11]. Modeling an implant from porous strands during surgery is complicated by the presence of roughness along its edges and the exposure of a large area of its open spongy structure, into which blood, small villi and bacteria easily penetrate. In the postoperative period, this can lead to suppuration of the implant, divergence of the conjunctival scar and relapse of retinoschisis. Such complications occur, according to our data, in 13.88% of cases, which requires repeated surgical interventions, as well as longer treatment [10].

In addition, when the implant is cut, i.e., its integrity is violated, properties such as elasticity, strength and tensile strength are lost. In this case, it is very difficult to dose the reproduction of a sufficient and safe depression shaft that blocks the retinal rupture.

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Purpose of this study. The purpose of our research was to search and develop more effective materials and methods for surgical and laser treatment of retinoschisis. To solve this problem, it was necessary to develop a universal design of a porous silicone implant. In this case, it was necessary to somehow change the composition of the known material, then determine the optimal design of the implant and test the methods of its use in experiment and clinical practice for the treatment of retinoschisis. It was also necessary to create a new method of laser treatment of retinal cysts in order to preserve the maximum possible function of central vision and prevent the occurrence of secondary retinal degenerations [4]. It was also necessary to develop a clinical classification of retinoschisis taking into account new treatment technologies.

Methods. As a result of many years of research, clinical observations and analysis of complications when using simulated porous implants and integral tourniquets, we, together with Medsil CJSC, have developed special compositions of silicone rubber. Vulcanization methods have been improved using platinum compounds, providing a high level of strength. In this case, the optimal density of the product was in the range of 0.3–0.5 kg/m3. After several series of tests on cadaver eyes, the universal shape of a new generation of porous implants was determined (patent No. 61548.08.14).

It corresponded to the shape of an oval segment, having a thin-walled outer monolithic layer, turning into a sponge filler of the internal volume, with a cross-section in the form of an oval with a maximum height in the range of 4–6 mm, the ratio of the height to the width of the oval was in the range of 0.65–0, 75. These tests also showed that the implant, with its convex surface facing the sclera and fixed to it with interrupted sutures, without any stretching, creates a depression shaft of the eye membranes 2-3 mm high, sufficient to block retinal breaks.

Fixing the implant to the sclera using interrupted sutures has a number of advantages over fixing it with flip-over U-shaped sutures. This is the ability to stitch the entire thickness of the implant and more superficial layers of the sclera using 4 to 10 sutures, which is very important for thinned scleral membranes. With this method of fixing the implant to the sclera, a more dosed applanation of the eye membranes occurs.

This is due to the fact that the segment-oval implant has an internal spongy structure, but is covered on all sides with a dense monolithic film, so its properties remain unchanged - unlike a cut tourniquet, which loses its strength properties and elasticity due to the exposure of a significant part of the spongy structure, filled with air. Therefore, the cut implant must be fixed to the sclera in a state of significant stretch to create an indentation shaft that blocks the tear in the retina. As a result, excessive compression of the eye vessels, membranes, and even a change in the shape of the eyeball occurs. These disadvantages are absent when using cancellous segment-oval implants.

As a result of many years of research work in order to create more effective modern methods of treating retinoschisis, its clinical classification was developed taking into account new technologies for treating this pathology of the fundus.

In total, 187 patients were under our supervision, of which 57 were operated on for stage III retinoschisis. The age range was from 16 to 70 years. The largest number of patients with myopia was noted - 185, of which 58 were with pseudophakia and 40 were with glaucoma. In 87 cases, patients were diagnosed with myopia and initial cataracts, in 2 cases - hypermetropia.

During surgical treatment, a standard ophthalmological examination and control ophthalmoscopy were performed daily for the first 2 weeks. after surgery, 2 months later. (in combination with ultrasound) and every 6 months. within 3–7 years. Patients after laser treatment were examined after 2 months. and every 6 months. for 3–7 years after surgery.

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Surgical technique: a conjunctival incision 6 mm from the limbus was made in 4 quadrants for circular applanation filling or in 1–2–3 quadrants. Next, the rectus muscles were placed on stay sutures. The localization of ruptures, the area occupied by the cyst and their marking on the sclera were carried out using a binocular ophthalmoscope. Then, in some cases, cryopexy was performed on these areas of the sclera under the control of binocular ophthalmoscopy until retinal whitening appeared. The segment-oval implant was selected based on its size exceeding the size of the rupture(s) by 2 mm. After this, it was placed with its convex surface on the sclera and sutured to it with several interrupted sutures on both sides in each quadrant without any stretching of the implant. The operation was completed with circular applanation filling by suturing the ends of the implant with two or three interrupted sutures. This manipulation was usually performed in the lower inner quadrant, with a preliminary injection of an antibiotic solution into them. During segmental filling, both ends of the implant were tightly sutured to the sclera with one or two interrupted sutures and also without stretching it. Dry broad-spectrum antibiotics were poured into the wound, the stay sutures were removed, and the conjunctiva was sutured with a frequent continuous suture [3]. A solution of antibiotic and corticosteroid was injected under the conjunctiva.

Drainage of intraretinal fluid was performed in a limited number of elderly patients with long-term retinal dissection. In other cases, they managed without drainage. However, almost all patients underwent laser coagulation before surgical treatment to delimit the macular region of the retina. Then, in the postoperative period, as retinoschisis flattened, some patients underwent sessions of step-by-step progressive laser coagulation to accelerate the resorption of intraretinal fluid and restore visual functions.

The method of step-by-step progressive laser treatment of retinoschisis is based on the peculiarities of the impact of infrared radiation from a diode laser on the retina at a wavelength of 0.87 microns, i.e., on its ability to coagulate the pigment epithelium without any signs of changes in the vessels and the composition of the blood in them. It is known that maximum energy absorption occurs in the pigment epithelium with a shift in the thermal effect towards the choroid. Successful use of the method of step-by-step progressive laser coagulation was recorded in 130 patients with retinoschisis stages II and III [10].

Results and discussion

In stage II retinoschisis (105 eyes), with a follow-up period of up to 3 years, after using step-by-step progressive laser coagulation, complete resorption of intraretinal fluid was obtained (100% of cases). In stage III retinoschisis (82 eyes), in 57 eyes (69.5%) after delimitation of the macular zone, applanation filling operations were performed using segment-oval implants, since new tears appeared and an increase in the retinoschisis zone. All operations were successful. Moreover, 57 operations (30.4%) were performed in all 187 patients (187 eyes). In 130 patients, only laser treatment was used, which was 69.5%. In 25 cases (30.48%) it was stage III retinoschisis. No complications were observed during laser coagulation or during long-term follow-up. There were also no signs of secondary retinal degeneration in the period from 3 to 5 years. Therefore, the use of the method of step-by-step progressive laser coagulation, starting with delimitation of the macular area, made it possible to maintain the maximum possible visual acuity in this category of patients.

No complications were noted during the operations. This is explained by the fact that the implants corresponded in size to the area of the ruptures, the smooth surface of the entire implant made it easy to pass it under the rectus muscles and eliminated the process of wrapping the outer shells around the implant, which inevitably occurred when using a simulated implant with an exposed spongy structure. With a smooth outer surface of the entire implant, no blood soaking was observed. In

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addition, the position of the implant with a convex surface on the sclera with its fixation with multiple interrupted sutures without stretching did not cause excessive compression of the vessels and membranes of the eye. This was confirmed by Doppler ultrasound mapping, according to which hemodynamic parameters were within normal limits. During follow-up periods of up to 7 years, there were no implant extrusions in any case.

Conclusion. The proprietary method of step-by-step progressive laser coagulation used in the treatment of retinoschisis showed effectiveness in patients with stage II retinoschisis in 100% of cases, and in patients with stage III – in 30.48% of cases.

The use of silicone porous segment-oval implants for the surgical treatment of retinoschisis has increased the effectiveness of surgical results. This is due to the fact that when using implants, modeling moments and associated difficulties and complications during the operation were excluded, which led to the absence of complications in the postoperative period. Positive results of surgical treatment are also associated with the use of several sessions of step-by-step progressive laser coagulation before surgical treatment, which made it possible to delimit the macular zone, move the cyst zone from the center of the retina, and also reduce its area.

This complex treatment made it possible to reduce the drainage of intraretinal fluid to 4.2% of cases. It should be noted that when performing circular applanation depression without any stretching of the implant, an optimal depression shaft is created that does not change the hemodynamic parameters of the operated eye compared to similar parameters of the other eye. This also indicates the effectiveness of the proposed method of treating retinoschisis.

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